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# Revised scientific names of the genus *Hemileia* (*Pucciniales*) based on the new ICN

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## Abstract

Based on the new International Code of Nomenclature for algae, fungi, and plants, specifically the effective deletion of Article 59, we provide a list of the revised scientific names of species in the genus *Hemileia* (*Pucciniales*). Five new combinations are proposed.

### Key words

Coffee rust, International Code of Nomenclature for algae, fungi, and plants, rust fungi, unit nomenclature

## Introduction

At the 18th International Botanical Congress in Melbourne, July 2011, the members agreed to fundamental changes concerning the naming of fungi. Of particular interest is the ending of the dual nomenclature system for fungi as previously governed by Article 59 of the outdated International Code of Botanical Nomenclature (McNeill et al. 2006). In the new International Code of Nomenclature for algae, fungi, and plants (ICN), one species of fungus may have only one scientific name. The use of separate names for the sexual and asexual states is no longer allowed. Thus, the legitimate and validly published names for one species must be considered with priority

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given to the oldest species epithet. This new rule is effective immediately as dictated by the ICN (McNeill et al. 2012). Although moving to the use of one scientific name is problematic especially for rust fungi, this brings the fungi in line with all other groups of organisms.

The taxonomy of rust fungi has been confused partly because of the difficulty in determining sexual and asexual states and connecting the various states for an individual species. Many genera were defined based on the presence of teliospores that produce basidia. Also serving as the resting or overwintering stage, teliospores are produced on dikaryotic hyphae with meiosis taking place in the basidia that develop from germinating teliospores. Asexual states usually bearing aeciospores or urediniospores were placed in genera such as *Aecidium* and *Uredo* that generally lacked phylogenetic meaning i.e. these genera did not unite related species. Some rust species that lacked known teliospores were described using scientific names in the appropriate genus but these were considered invalid names because of the lack of teliospores as dictated by Article 59 of the International Codes of Botanical Nomenclature such as McNeill et al. (2006). Once a specimen with teliospores was discovered, a new name with another type specimen was published in the appropriate genus or, in some cases, the old name was considered to be validated by the species having teliospores. With the changes in the rules of the ICN, the scientific names of many rust fungi must be re-evaluated with priority given to the oldest epithet for a species regardless of the genus in which it was described.

The objective of this paper is to provide a list of scientific names of species in the rust genus *Hemileia* that brings the scientific names into accordance with the ICN. The genus *Hemileia* was recently revised by Ritschel (2005). At that time a number of species were placed in *Uredo* even though they were considered to belong in *Hemileia* because they lacked teliospores. With the new ICN these names compete for priority and can now be placed in *Hemileia*. This revision of the scientific names of *Hemileia* is based entirely on the account of the genus published by Ritschel (2005). Of the 42 names included Ritschel (2005), 26 names need to be changed i.e. the correct scientific name already exists but was not recognized as such in *Hemileia*. These include five new combinations required because the oldest epithet needs to be placed in the genus *Hemileia*. The scientific name of the fungus that causes coffee rust, thankfully, remains unchanged, as *Hemileia vastatrix*.

## Material and methods

This account is based on the Ritschel (2005) "Monograph of the genus *Hemileia* (*Uredinales*)." Further literature was consulted when the comments in Ritschel (2005) did not provide sufficient information. For the implementation of the new rules concerning dual nomenclature, we consulted Braun (2012), Hawksworth et al. (2011) and Norvell (2011), articles describing the most significant changes and impacts of the new ICN on dual nomenclature of pleomorphic fungi.

## Results

***Hemileia africana* (Lagerh.) Judith & Rossman, comb. nov.**
Mycobank: MB 801490
http://species-id.net/wiki/Hemileia_africana

Basionym: *Uredo africana* Lagerh., Bol. Soc. Brot. 7: 135, 1889.
= *Uredo ancylanthi* Henn. in Baum, Botanische Ergebnisse der Kunene-Sambesi-Expedition 1903, 728: 158, 1903.
≡ *Hemileia ancylanthi* (Henn.) Syd., Monogr. Ured. 3: 208, 1915.

**Comments.** The name *Uredo africana* 1889 has priority over the other basionym, *U. ancylanthi* 1903, thus *U. africana* is transferred to the genus *Hemileia*.

***Hemileia alafiae* (Cummins) Judith & Rossman, comb. nov.**
Mycobank: MB 801491
http://species-id.net/wiki/Hemileia_alafiae

Basionym: *Uredo alafiae* Cummins, Bull. Torrey Bot. Club 79: 230, 1952.

**Comments:** Only the uredinial stage is known for this species that is herein placed in the genus *Hemileia* based on the comments in Ritschel (2005).

***Hemileia aureospora* J.-M. Yen, Rev. Mycol. (Paris) 40: 127, 1976.**

= *Uredo aureospora* Cummins, Bull. Torrey Bot. Club 87: 41, 1960.

**Comments.** *Uredo aureospora* 1960 has priority but it cannot be moved to *Hemileia* because that name already exists in the genus. For this reason the next oldest name *H. aureospora* is the accepted scientific name for this species of which *U. aureospora* is a taxonomic synonym. Although the name *H. aureospora* was previously considered to be not validly published because the type specimen lacked teliospores and thus violated Article 59 of the now outdated International Code of Botanical Nomenclature (ICBN) (Stafleu et al. 1972), the new ICN allows this name to be used.

***Hemileia deightonii* Syd., Ann. Mycol. 35: 247, 1937.**

≡ *Uredo deightonii* (Syd.) Cummins, Bull. Torrey Bot. Club. 87: 42, 1960.
= *Hemileia rauvolfiae* J.-M.Yen & Gilles, in J.-M.Yen, Rev. Mycol. 40: 129, 1976.

**Comments.** Based on the principle of priority, *Hemileia deightonii* is the correct name for this species. This name had been placed in *Uredo* because of the lack of teliospores as dictated by the ICBN in effect at that time but is now allowed by the ICN.

***Hemileia dioscoreae-aculeatae* (Racib.) Syd., Monogr. Ured. 3: 220, 1915.**

≡ *Uredo dioscoreae-aculeatae* Racib., Paras. Alg. Pilz. Javas I: 30, 1900.

**Comments.** *Uredo dioscoreae-aculeatae* serves as the basionym for this species.

***Hemileia evansii* Syd., Ann. Mycol. 10: 34, 1912.**

≡ *Uredo evansii* (Syd.) Ritschel, Bibl. Mycol. 200: 78, 2005.

**Comments.** Because the presence of teliospores on the type material of *Hemileia evansii* could not be confirmed as required at that time, Ritschel (2005) published a new combination in the genus *Uredo*. This name is now listed as a nomenclatural synonym.

***Hemileia fadogiae* Syd., Ann. Mycol. 10: 34, 1912.**

= *Uredo fadogiae* Henn., Ann. Mus. Congo, Bot., Sér. 5 Vol. 2(2): 94, 1907.

**Comments.** *Hemileia fadogiae* is the correct name for this species because transferring the epithet having priority, *Uredo fadogiae*, into *Hemileia* would result in a later homonym. Because of this, it is necessary to use the next available epithet, in this case *H. fadogiae*.

***Hemileia gardeniae-floridae* Sawada, Trans. Nat. Hist. Soc. Formosa 21: 234, 1931.**

≡ *Uredo gardeniae-floridae* (Sawada) Hirats. f., Sci. Bull. Agric. Div. Univ. Ryukyus 7: 279, 1960.

**Comments.** Because Hiratsuka (1960) could not find the type specimen and thus could not confirm the presence of teliospores in *Hemileia gardenia-floridae*, he placed this epithet in *Uredo*. Under the ICN *H. gardeniae-floridae* is the correct scientific name for this species.

***Hemileia hansfordii* Syd., Ann. Mycol. 37: 198, 1939.**

≡ *Hemileia wakefieldii* Ritschel, Bibl. Mycol. 200: 64, 2005.
[≡ *Hemileia hansfordii* Wakef. & Hansf., Proc. Linn. Soc. London 161:165, 1949, hom. illeg. non Syd. 1939]

**Comments.** The name *Hemileia hansfordii* Syd. has priority but was not used previously because of the lack of teliospores on the type specimen. Wakefield and Hansford (1949) described a new name for this species when they found teliospores but their name was a later homonym of the existing *H. hansfordii* Syd. Ritschel (2005) provided a new name for this species but that name, *H. wakefieldii*, is now considered a nomenclatural synonym because the oldest name is now legitimate.

***Hemileia holstii* (Henn.) Syd., Monogr. Ured. 3: 213, 1915.**

≡ *Uredo holstii* Henn., in Engler, Pflanzenw. Ost-Afrikas Teil C: 52, 1895.
= *Uredo psychotriae-volkensii* Henn., in Engler, Pflanzenw. Ost-Afrikas Teil C: 52, 1895.
= *Uredo mkusiensis* Henn., Bot. Jahrb. Syst. 34: 41, 1905.

**Comments.** The names *Uredo holstii* and *U. psychotriae-volkensii* were both published on the same page and thus are considered equal in priority. Because *Uredo holstii* had already been placed in *Hemileia*, this basionym is considered to have priority.

***Hemileia kilimanjarensis* (Ritschel) Judith & Rossman, comb. nov.**
Mycobank: MB 801492
http://species-id.net/wiki/Hemileia_kilimanjarensis

Basionym: *Uredo kilimanjarensis* Ritschel, Bibl. Mycol. 200: 83, 2005.

**Comments.** When Ritschel (2005) described *Uredo kilimanjarensis*, she recognized that it belonged in the genus *Hemileia* but this would have violated the ICBN in effect at that time. Under the ICN, this name may now be transferred accordingly.

***Hemileia kumasensis* (Cummins) Judith & Rossman, comb. nov.**
Mycobank: MB 801493
http://species-id.net/wiki/Hemileia_kumasensis

Basionym: *Uredo kumasensis* Cummins, Bull. Torrey Bot. Club 87: 42, 1960.

**Comments:** When Cummins (1960) described *Uredo kumasensis*, he recognized the affinities of this species with *Hemileia*. Under the ICN, this name is newly combined in *Hemileia*.

***Hemileia laurentii* (Henn.) Syd., Monogr. Ured. 3: 215, 1915.**

≡ *Uredo laurentii* Henn., in De Wildeman, État Indépendant du Congo. Mission Émile Laurent (1903–1904). Fasc. 4: 356, 1907.

**Comments.** Ritschel (2005) attributed this name in *Hemileia* to Syd., however, with the change in the ICN, *Uredo laurentii* Henn. serves as the basionym for this species and the author citation should be (Henn.) Syd.

***Hemileia mbelensis* (Henn.) Syd., Monogr. Ured. 3: 223, 1915.**

≡ *Uredo mbelensis* Henn., Ann. Mus. Congo, Bot., Sér. 5 Vol. 2(2): 94, 1907.

**Comments.** Prohibited from recognizing this epithet in *Hemileia* by the ICBN in effect at the time, Ritschel (2005) included this species as *Uredo mbelensis* in her monograph. With the new ICN, this species can now be recognized in the appropriate genus.

***Hemileia mildbraedii* (Syd.) Syd., Monogr. Ured. 3: 212, 1915.**

≡ *Uredo mildbraedii* Syd., Deutsche Zentral-Afrika Expedition, 1907/08, 2: 98, 1911.
= *Hemileia sydowiorum* Ritschel, Bibl. Mycol. 200: 56, 2005.
[= *Hemileia pavetticola* Roger, Bull. Soc. Mycol. France 54: 48, 1938, nom. nud.]

**Comments.** Because the type specimen of *Uredo mildbraedii* lacked teliospores, Ritschel (2005) described a new species, *Hemileia sydowiorum*, using a type specimen having teliospores. With the new ICN, *U. mildbraedii* provides the epithet of priority for this species. The name *H. pavetticola* Roger was published without a Latin diagnosis. Ritschel (2005) lists 1914 as the year of publication for the name *Uredo mildbraedii*, while, in fact, this name was published earlier in the account of the first expedition that appeared in 1911.

***Hemileia mussaendae* Vienn.-Bourg., Bull. Soc. Mycol. France 67: 431, 1951.**

= *Hemileia pieningii* Deighton, Trans. Brit. Mycol. Soc. 55: 497, 1970.
[= *Hemileia mussaendae* Cummins, Bull. Torrey Bot. Club. 87: 36, 1960 non Vienn.-Bourg. 1951, hom. illeg. non Vienn.-Bourg. 1951]

**Comments.** *Hemileia mussaendae* Vienn.-Bourg. was the first name published for this species. Because the type specimen lacked teliospores, Cummins (1960) established a new name using another type specimen. Because Cummins' (1960) name is a later homonym of *H. mussaendae* Vienn.-Bourg., Deighton (1970) provided a new name based on the same type specimen. With the new ICN, the oldest epithet has priority.

***Hemileia oxyanthi* Cummins, Bull. Torrey Bot. Club 68: 467, 1941.**

≡ *Uredo oxyanthi* (Cummins) Cummins, Bull. Torrey Bot. Club 87: 42, 1960.

**Comments.** Following the new ICN, *Hemileia oxyanthi* (1941) is the correct name for this species.

***Hemileia phaji* (Racib.) Syd., Monogr. Ured. 3: 222, 1915.**

≡ *Uredo phaji* Racib., Paras. Alg. Pilz. Javas II: 32, 1900.

**Comments.** With the new ICN, *Uredo phaji* serves as the basionym for this species recognized in *Hemileia*.

***Hemileia rhois* E. Castell., Nuovo Giron. Bot. Ital., new ser. 49: 20, 1942.**

= *Hemileia castellanii* Ritschel, Bibl. Mycol. 200: 21, 2005.

**Comments.** Because *Hemileia rhois* is based on urediniospores, Ritschel (2005) published a new name for this species based on a type specimen with teliospores. With the new ICN, the correct name based on the rules of priority is the oldest one.

***Hemileia scheffleri* (Syd. & P. Syd.) Syd., Monogr. Ured. 3: 220, 1915.**

≡ *Uredo scheffleri* Syd. & P. Syd., Bot. Jahrb. Syst. 45: 262, 1910.

**Comments.** When Sydow and Sydow (1915) published the name *Hemileia scheffleri,* they attributed it only to Syd., however, the name is clearly based on *Uredo scheffleri* i.e. both names are based on the same type specimen. With the new ICN, this name in *Hemileia* is the correct name for this species.

***Hemileia scitula* Syd., Ann. Mycol. 35: 247, 1937.**

≡ *Uredo scitula* (Syd.) Cummins, Bull. Torrey Bot. Club 87: 43, 1960.

**Comments.** Following the new ICN, *Hemileia scitula* is the correct name for this species.

***Hemileia secamones*** **Wakef. & Hansf., Proc. Linn. Soc. London 161: 166, 1949.**

≡ *Uredo secamones* (Wakef. & Hansf.) Gjaerum, in Gjaerum et al., Lidia 5: 2, 2000.

**Comments.** With the new ICN, *Hemileia secamones* can be resurrected as the correct name for this species.

***Hemileia smallii*** **Wakef. & Hansf., Proc. Linn. Soc. London 161: 166, 1949.**

= *Hemileia smalliana* Gjaerum, in Gjaerum et al., Lidia 5: 2, 2000.
[= *Hemileia smallii* Fernier, Rev. Mycol. (Paris), Suppl. Colon. 19: 62, 1954 *hom. illeg.* non Wakef. & Hansf. 1949]

**Comments.** Following the new ICN, *Hemileia smallii* has priority even though the type specimen includes only the asexual stage of this species. Fernier (1954) described a name for the teleomorph using a different type specimen. Because he used the same epithet, that name is an illegitimate, later homonym. For this reason Gjaerum et al. (2000) established another name for this species based on a different type specimen that is here regarded as a taxonomic synonym.

***Hemileia solaninum*** **(Henn.) Judith & Rossman, comb. nov.**
Mycobank: MB 801494
http://species-id.net/wiki/Hemileia_solaninum

Basionym: *Uredo solaninum* Henn., Bot. Jahrb. Syst. 28: 319, 1901.
= *Uredo scholzii* Henn., Bot. Jahrb. Syst. 33: 34, 1904.
= *Hemileia scholzii* Syd. & P. Syd., Bot. Jahrb. Syst. 45: 260, 1910.

**Comments.** Based on the comments in Ritschel (2005), *Uredo solaninum* is considered to be the oldest name for this species and is thus transferred to *Hemileia*. The other names are based on different type specimens that occur on different hosts but are considered by Ritschel (2005) to apply to the same species, thus they are listed here as taxonomic synonyms.

***Hemileia sonsensis*** **(Henn.), Syd. & P. Syd., Monogr. Ured. 3: 217, 1915.**

≡ *Uredo sonsensis* Henn. Ann. Mus. Congo, Bot. Sér. 5(2): 94, 1907.

**Comments.** Considering the new ICN and comments by Ritschel (2005), this species should be classified in *Hemileia*.

***Hemileia thomasii*** **Thirum. & Naras., Ann. Bot. 11: 87, 1947.**

= *Hemileia randiicola* Thaung, Trans. Brit. Mycol. Soc. 66: 108, 1976.

**Comments.** Because of the lack of teliospores on the type specimen of *Hemileia thomasii*, Thaung (1976) established a new species with another type specimen. With the new ICN the name, *H. thomasii* has priority as the name for this species.

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